Variability and distribution of *Clavatula mystica* (Reeve, 1843)

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ABSTRACT

The taxonomic identity and distribution of *Clavatula mystica* (Reeve, 1843) are studied on the basis of new records. The important variability of its shell morphology partially explains the ambiguous identity of the species in the literature and the frequent confusion with other taxa. The distribution of *C. mystica* is shown to range from Gran Canaria to Casamance, Senegal.

RESUMEN

Se estudian la identidad taxonómica y la distribución de *Clavatula mystica* (Reeve, 1843) a partir de reciente información. La variabilidad de la morfología de la concha explica parcialmente la dudosa identidad de esta especie en la literatura y su frecuente confusión con otros taxones. El área de distribución de *C. mystica* se extiende desde Gran Canaria hasta Casamance, en Senegal.

KEY WORDS: Gastropoda, Turridae, *Clavatula*, variability, distribution, West Africa.
PALABRAS CLAVE: Gastropoda, Turridae, *Clavatula*, variabilidad, distribución, África occidental

INTRODUCTION

The turrid genus *Clavatula* Lamarck, 1801, known as ranging off West and South Africa, belongs to a subfamily Clavatulinae considered by KILBURN (1985: 417) as remaining "a rather poorly characterised group". The species attributed to *Clavatula* do not show well-defined features, and intergrading characters with allied genera often occur, as far as shell morphology, protoconch or radula are concerned (see POWELL, 1966; KILBURN, 1985).

The genus *Clavatula* has never been revised as a whole, and it might well be in reality a polyphyletic group. As KILBURN (1985: 424) suggested: "The genus *Clavatula*, as here understood, may have to be reinterpreted when the West African species are better studied".

The deeper cause of the confusion about the taxonomy of the Clavatulinae probably lies in their considerable intraspecific variability. According to KILBURN (1985: 421), "the littoral Clavatulinae are probably the most variable of the Turridae". Even in West African *Clavatula*, somewhat abundant in the field and very popular in collections, none of the species has ever been studied from the point of view of variability, and the limits of individual species remain very imprecise for most of the taxa attributed to this group.

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The status of the type species *Clavatula coronata* Lamarck, 1801 (synonym: *P. muricata* Lamarck, 1822, fide Tryon, 1884) itself requires a revision taking into account the existence of several squat ventricose morphs ranging from Gambia to Angola. Such a study is currently under way by the first author.

The case of *Clavatula mystica* (Reeve, 1843), considered one of the most common West African *Clavatula*, is studied here from the specific point of view of its variability, intending to clarify the taxonomic status of the species and to contribute to a better understanding of the *Clavatula* radiation.

Abbreviations

ad = adult
subad = subadult
juv = juvenile
ge = gerontic
NHM = The Natural History Museum, London
JHC = J. Hernandez Collection
JFC = J. Ferreiro Collection
FGC = F. Gubbioli Collection
FBC = F. Boyer Collection.

RESULTS

Subfamily Clavatulinae H. and A. Adams, 1853
Genus *Clavatula* Lamarck, 1801

Type-species, by monotypy: *Clavatula coronata* Lamarck, 1801 (synonym: *Pleurotoma muricata* Lamarck, 1822).

Clavatula mystica (Reeve, 1843) (Figs. 1-16)

Pleurotoma mystica Reeve, 1843: 183; *Conch. Icon., Pleurotoma*, pl. 12, fig. 107.
Pleurotoma sacerdos Reeve, 1845: 110; *Conch. Icon., Pleurotoma*, pl. 20, fig. 172.

Type material: In NHM, not available for study.
Material examined: JHC. Senegal: Pointe Sarène, 3-7 m, 08-96, 1 ad, L = 32.83 mm; Thiaroye, 5-7 m, 08-96, 3 ad, L = 24.96 to 29.04 mm; Baie de Hann, 3-5 m, 01-83, 1 ad, L = 30.21 mm; Gorée, 20 m, 01-90, 5 ad, L = 25.96 to 28.82 mm; Gorée, 13-15 m, 08-96, 3 ad, L = 18.37 to 27.45 mm; Gorée, 13-15 m, 09-99, 3 ad, L = 28.48 to 33.76 mm; Dakar, Anse Bernard, 5-12 m, 09-77, 1 ad, L = 25.62 mm. Mauritania: Nouadhibou, 40 m, 01-89, 2 ad + 1 ge, L = 29.42 to 32.34 mm. West Sahara: 22° 17' N, 17° 22' W, 75 m, 10-88, num. subad + ad, L = 14 to 19 mm; 22° 35' N, 16° 58' W, 60 m, 01-88, num. subad + ad, L = 14 to 25 mm; 24° 45' N, 16° 25' W, 32 m, 01-88, num. subad + ad, L = 17 to 22 mm; N.W. Cabo Barba, 60 m, 12-87, num. subad + ad, 12 to 18 mm. Canary Islands: Fuerteventura, Granillo, crabs at low tide, 09-90, 2 subad + 3 ad, L = 14.66 to 18.47 mm; Gran Canaria, Gando, 3 m, 3 subad + 2 ad, L = 12.74 to 20.57 mm; Gran Canaria, El Rincón, low tide, 01-75, 10 subad + ad, L = 14 to 24mm. JFC. Gran Canaria, San Cristobal, pots, 30-40 m, 03-00 to 01-01, 2 ad + 1 ge, L = 17 to 25.5 mm. FGC. Senegal: Casamance, 1 subad, L = 18 mm; Gorée, 1 juv + 3 ad, L = 19 to 27 mm. West Sahara, 5 subad + ad, L = 24 to 35 mm. Gran Canaria: Arinaga, 4-5 m, 07-96, 1 ad, L = 23 mm; La Laja, 40 m, 1 subad + 1 ge, L = 23 and 47 mm. FBC. Senegal: Pointe Sarène, 3-7 m, 08-96, 7 ad, L = 31 to 36.3 mm; Ndéyane, low tide, 04-99, 3 subad + 1 ad, L = 17 to 22 mm; Thiaroye, 5-7 m, 08-96, 1subad + 6 ad, L = 29 to 38.5 mm; Gorée, 13-15 m, 08-96 to 09-99, 5 juv + 1 subad + 10 ad, L = 21 to 32 mm. West Sahara: trawled, num juv + subad, L = 13.85 to 26.05 mm. Gran Canaria: Arinaga, 0-4 m, 07-02, num juv, L = 1.3 to 1.8 mm; San Cristobal, pots, 30-40 m, 1 subad, L = 23.7 mm; El Rincón, low tide, 01-75, 3 juv, L = 14.85 to 19.30 mm.
Type locality: *Clavatula mystica* (Reeve, 1843) and its synonym *Clavatula sacerdos* (Reeve, 1845) were both described without type-locality ("Hab.?"). Referring to the pictures given in Conchologia Iconica, both names were clearly based on similar phenae showing the special features represented in the populations from Senegal, such as sharp carinae, protuberant spiral nodules and contrasted dark colours. So, Senegal is proposed here as type-locality of *C. mystica*.

Original description: "*Pleurotoma mystica*. Pleur. testâ abbreviato-fusiformi, rubido-fuscâ; anfractibus supernè concavis, striatis, infrà angulatis, tuberculis albis, connatis, ad angulum acutè carinatis; anfractu ultimo infernè nodulorum seriebus plurimis cingulato.

Conch. Icon., *Pleurotoma*, pl. 12 fig. 107.

Hab.?

Chiefly distinguished by the white turreted keel".

Complementary description of the shell (Figs. 1-13, 15): The protoconch consists of 2.5 smooth, slightly bulging whorls (Figs. 5, 15). It is followed by 8 whorls at the adult stage. The upper part of the last whorl and the spire show a pyramidal outline formed by a pronounced carina situated at the first third of the last whorl and at the base of the other whorls. This carina is bordered by strong spiral nodules, which develop downward as short and thick, undulated axial ribs. At the mid-part of the last whorl, a less prominent carina ranges under the upper one; it is bordered by smaller and more rounded nodules. Several spiral rings of small to obsolete nodules range along the basal part of the shell.

The thin and spaced spiral cords which cover the entire shell are sometimes more pronounced between the 2 main rings of produced nodules at the mid-part of the last whorl, and they can be absent from the nodules themselves. The pattern of the spiral cords on the rest of the shell is more obsolete (Fig. 4). Heavy growth marks are generally present all along the whorls and are more pronounced on the last three whorls. They can form short spines under the sutures. A deep anal notch is present at the top of the labrum (Fig. 6). The aperture is around 40% of total length. The siphonal canal is in size moderate to long (Figs. 1, 9).

The apex is smooth, narrow and very slender. The first whorls are not carinated and show a sculpture of dextrally oriented chevrons, sometimes divided into two spiral ranks of oblique nodules, separated by one spiral rank of smaller rounded ones (Fig. 5). Gerontic shells (Fig. 10) show a widened callous base around a large umbilicum, faintly pronounced in younger specimens.

Shells from Senegal (Figs. 1-9) show a squatter and more angular outline, with sharper peripheral nodules, whereas those from Northern Mauritania, Western Sahara and the Canary Islands (Figs. 10-16) show a more slender outline, less pronounced carinae and more obsolete peripheral nodules.

The shells from Senegal display a wide range of ground colours, from whitish or beige to grey, orange, brown or black. The peripheral nodules are almost white. The first whorls are creamy white or beige. Very contrasted bicoloured or tricoloured shells are frequent.

The shells from Northern Mauritania, Western Sahara and the Canary Islands show lighter ground colours ranging from whitish or creamy-beige to dull orange or light tan.

Dimensions: The length of adult shells ranges from 18 to 47 mm. A record-length of 65 mm is given by NORDSIECK AND TALAVERA (1979: 156).

Animal (Figs. 14,16): The head and foot are whitish, the sides of the foot are decorated with small blackish spots and marks, the siphon is mottled white. The large heartshaped operculum is amber-orange.

Distribution: The species seems to have a continuous geographic distribution from Casamance to Western Sahara, and it also reaches the Canary Islands. Casamance seems to be the southern limit of *C. mystica*, as the specimens recorded from this place are very rare, and no specimen is known from Guinea and Guinea-Bissau, despite the occurrence of many other *Clavatula* in the Guinean area. The species is also absent from the Gulf of Guinea (pers. comm. from P. Ryall, Ghana). KNUDSEN (1956: 95) cites the species from only one station off Senegal and another one off Gambia, but not from any of the numerous stations of the "Atlantide" Expedition situated southward.

C. mystica is found off Fuerteventura and Gran Canaria, but its presence off the other Canarian islands is not recorded. The species ranges off the northern and eastern coasts of Gran Canaria, but it is apparently missing from the western coasts.

The occurrence of the species along the Moroccan coast north of Cape Juby is not confirmed. However the species must be considered as having the most northerly distribution among the West African *Clavatula*. According to NICKLES (1950: 124), the species is known from the Old Quaternary of Morocco.

The bathymetric distribution of *C. mystica* is known to range from low tide level (Ndéyane, Petite Côte, Senegal) to 75 m (off Western Sahara).

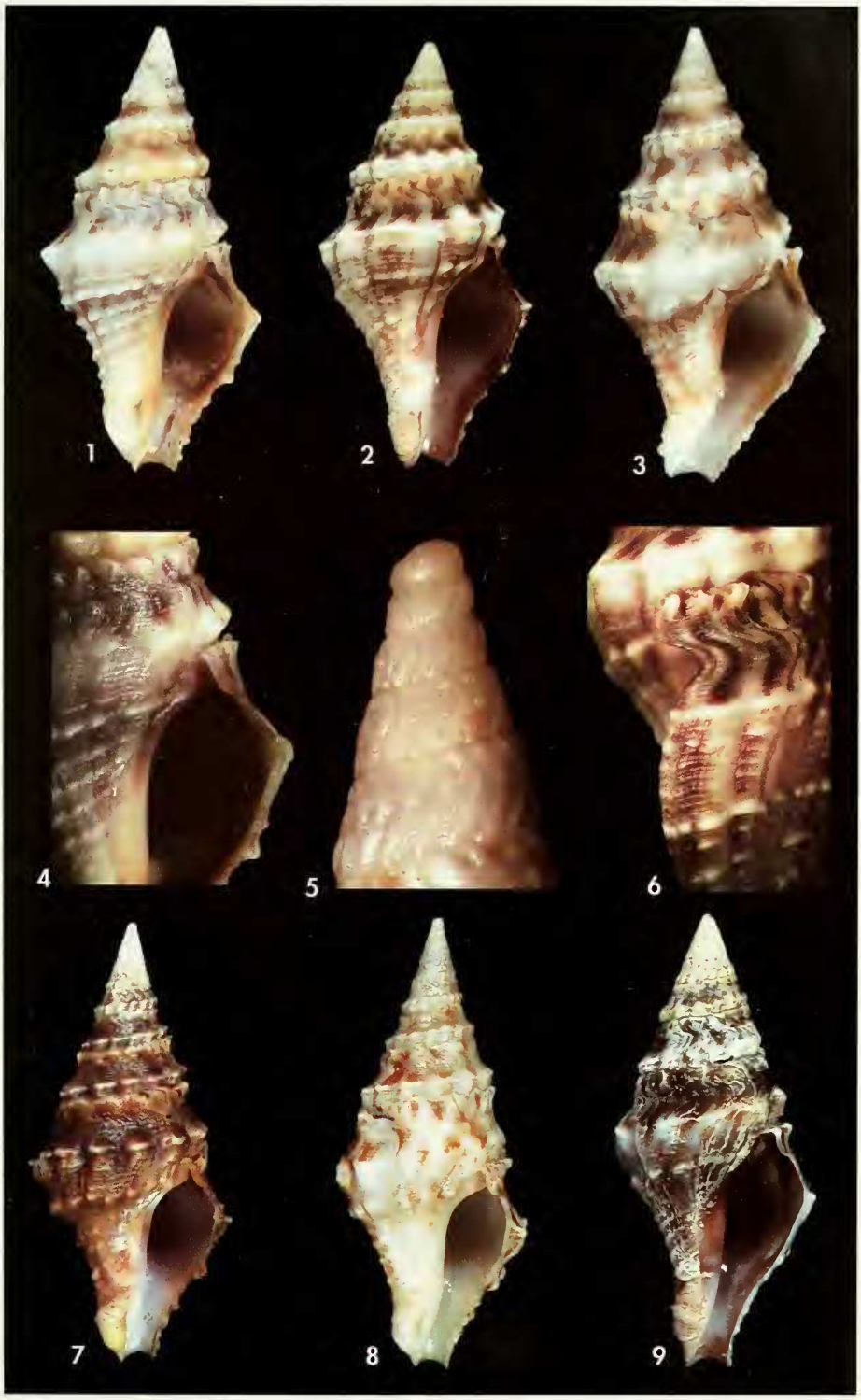
Remarks: Attribution of the material studied to the species *P. mystica* Reeve, 1843 is effected on the basis of the original description (REEVE, 1843: 183) and of the type figures of *P. mystica* and *P. sacerdos* in Conchologia Iconica (*Pleurotoma*: Figs. 107, 172). Despite the fact that the type specimens are not available for consultation, the shell features given by the type figures, corroborated by the original descriptions, do not leave any doubt about the identity of both *P. mystica* and *P. sacerdos*.

The identification and naming of *C. mystica* have been the subject of great confusion in literature. Under the name of "*Clavatula sacerdos* Reeve, 1845", MALTZAN (1883: pl. 3, fig 10) pictured a gerontic specimen of *C. mystica*. MALTZAN (1883: 127) considers that *C. sacerdos* corresponds to "Le Farois" of Adanson, this last taxon also being said to present some similarities with *C. muricata*. FISCHER-PIETTE (1942: 238) believes "Le Farois" of Adanson is *C. bimarginata*, due to the finding in Adanson's collection of a shell belonging to this species, labelled as "Le Farois" and similar to the Adanson's figure. FISCHER-PIETTE (1942) admits however that Adanson's description is ambiguous and may well be based simultaneously on *C. bimarginata* and *C. sacerdos*.

MALTZAN (1883) notes also that *C. sacerdos* is somewhat variable, and he quotes separately "*C. sacerdos* var. *mystica* Reeve, 1843", implicitly recognizing the synonymy between both names, even if not following the correct order of seniority that should prevail. This probably comes from the fact that the type-figure of *C. mystica* shows a squat wide shell in dorsal view, whereas the type-figure of *C. sacerdos*, published two years later, shows a slenderer shell in ventral view: the type-figure of *C. sacerdos* gives a more complete definition of the species, and it corresponds to the most common form found in Senegal, whereas the type-figure of *C. mystica*, even if illustrating well shell outline and sculpture, does not show the aperture and represents an unusual short-siphon outline. In these circumstances, MALTZAN (1883) took the taxon *C. sacerdos* as the better representative of the species and he used it as such, introducing the custom of using alternatively *C. sacerdos* or *C. mystica* for the same species, and inaugurating the confusion about its taxonomic status.

Following this tradition, NICKLES (1950: 124) pictures a representative shell of *C. mystica* from Senegal under the name of *C. sacerdos*. *C. mystica* will be correctly given by KNUDSEN (1952: 143-145) and by POWELL (1966: 56) as senior synonym of *C. sacerdos*. However KNUDSEN (1952) himself seems to accept

(Right page) Figures 1-9: *C. mystica*, Senegal; 1: Gorée, 20 m, 27.47 x 14.11 mm; 2: Gorée, 13-15 m, 32.48 x 15.29 mm; 3: Gorée, 13-15 m, 28.48 x 14.31 mm; 4: like Fig. 1; 5: Gorée, 20 m, 28.82 x 12.32 mm; 6: like Fig. 2; 7: Thiaroye, 5-7 m, 29.04 x 12.9 mm; 8: Gorée, 20 m, 28.87 x 13.01 mm; 9: Pointe Sarène, 3-7 m, 32.83 x 14.46 mm.
(Página derecha) Figuras 1-9: C. mystica, *Senegal; 1: Gorée, 20 m, 27,47 x 14,11 mm; 2: Gorée, 13-15 m, 32,48 x 15,29 mm; 3: Gorée, 13-15 m, 28,48 x 14,31 mm; 4: concha de la Fig. 1; 5: Gorée, 20 m, 28,82 x 12,32 mm; 6: concha de la Fig. 2; 7: Thiaroye, 5-7 m, 29,04 x 12,9 mm; 8: Gorée, 20 m, 28,87 x 13,01 mm; 9: Pointe Sarène, 3-7 m, 32,83 x 14,46 mm.*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C. bimarginata in the synonymy of *C. mystica* and so maintains the ambiguity about the identity of the species.

The species was never quoted from the Canary Islands under its proper name. ODHNER (1931: 21-22) quotes "*Clavatula bimarginata* Lamarck, 1822" from Gran Canaria, and the species will be requoted and figured under that same name by NORDSIECK AND GARCÍA-TALAVERA (1979: 156, pl. 39, fig. 1) as ranging from Fuerteventura to Gran Canaria.

Since *C. mystica* is the only*Clavatula* confirmed by recent captures as occurring in Canary Islands, the real identity of the species recorded by Odhner cannot leave any doubt. In the figure presented by Nordsieck and García-Talavera, even if allowing for a certain "artistic liberty", all the principal features of *C. mystica* are shown.

DISCUSSION

Placement of *C. mystica* within the genus *Clavatula* is proposed as provisional on the basis of its similarities with the type-species *C. coronata* Lamarck (= *P. muricata* Lamarck).

The spire is higher in *C.coronata*, the general outline of its last whorl is more inflated, rounded and faintly carinated, the well-defined cord-like rings of axially oriented nodules form also a noticeably squared pattern on four fifths the last whorl. Simple ranks of well-spaced nodules are situated at the base of the other whorls, and protuberant spines are generally formed by growth lines just under the suture of the three last whorls. The first whorls of *C. coronata* are much more stepped than those of *C. mystica*, the central and the upper part of these whorls do not bear nodules and are almost smooth.

However, many similarities occur between both species: the protoconch and the thin spiral cords which cover the entire shell are very similar, even if these cords are more obsolete in *C. coronata*. The general shape of the aperture, of the siphonal canal and of the external lip are also similar, even if the labrum is more rounded and enveloping in *C. coronata*, with a deep labial sinus. The tendency of growth lines to form spines under the lower sutures must also be considered as a shared feature.

C. mystica presents also some similarities with *C. diadema* (Kiener, 1839-40). In particular, the first whorls of *C. mystica* show the same regular outline and bear the same pattern of axial ribs and nodules as *C. diadema*.

But *C. mystica* shows the closest affinities with *C. bimarginata* (Lamarck, 1822) having in common carinated outline, proportions of the shell and of the aperture, and shape of the siphonal canal, the outer lip and the labial sinus. However, the first whorls of *C. bimarginata* are more similar to those of *C. coronata*, its protoconch is smaller than in *C. mystica*, the upper part of its last whorl is more elevated than in *C. mystica* and tends to form a rank of long axial nodules, the spines are lacking and the spiral cords are thicker and less numerous.

It must be noted that the radula of *C. mystica* pictured in POWELL (1966: 11, fig. 61), showing a half-rank of two slender

Figures 10-16: *C. mystica;* 10: Nouadhibou, 40 m, 32.34 x 13.2 mm; 11: Western Sahara, 60 m, 18.36 x 7.53 mm; 12: Fuerteventura, Granillo, low tide, 18.47 x 7.25 mm; 13: Gran Canaria, Gando, 3 m, 20.57 x 8.85 mm; 14: Gran Canaria, San Cristobal, 30-40 m, 21 x 9 mm; 15: like Fig. 11; 16: like Figure 14.

Figuras 10-16: C. mystica*; 10: Nouadhibou, 40 m, 32,34 x 13,2 mm; 11: Sahara occidental, 60 m, 18,36 x 7,53 mm; 12: Fuerteventura, Granillo, marea baja, 18,47 x 7,25 mm; 13: Gran Canaria, Gando, 3 m, 20,57 x 8,85 mm; 14: Gran Canaria, San Cristobal, 30-40 m, 21 x 9 mm; 15: concha de la Fig. 11; 16: concha de la Figura 14.*


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lateral teeth and a tiny central tooth made of a small spine emerging from a reduced triangular plate, is similar to the radula of *C. muricata* pictured in GOFAS (1990: 21, fig. 30), this last one showing however a somewhat larger square central plate.

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